DOCUMENT RESUME

ED 456 227 CE 082 177

TITLE	The Linkage System[C]: Linking Academic Content Standards and Occupational Skill Standards. A Process To Enhance Workforce Quality and Improve Academic Performance. Version 1.2. Revised [and] Taxonomy of Academic Performance Indicators: An Update of the V-TECS/Snyder Basic/Essential Skills Taxonomy.
INSTITUTION	Vocational Technical Education Consortium of States, Decatur, GA.
PUB DATE	2000-00-00
NOTE	54p.; "The Linkage System" was authored by Charles Losh and the "Taxonomy" by Lester M. Snyder, Jr. Earlier version titled "Basic/Essential Skills Taxonomy."
AVAILABLE FROM	For full text: http://www.v-tecs.org/Documents/Linkage%20System.pdf. For full text: http://www.v-tecs.org/Documents/Taxonomy2K.pdf.
PUB TYPE	Guides - Non-Classroom (055) -- Reference Materials - Vocabularies/Classifications (134)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Academic Education; *Academic Standards; *Classification; Competence; Coordination; Definitions; *Education Work Relationship; Educational Planning; Educational Research; *Employment Qualifications; Guidelines; Information Utilization; Instructional Development; Job Analysis; *Job Skills; Labor Force Development; Material Development; Occupational Information; Performance Factors; Postsecondary Education; Research Utilization; Secondary Education; State Standards; Systems Approach; Theory Practice Relationship; Validity; *Vocational Education
IDENTIFIERS	Crosswalks (Linking)

ABSTRACT

The Linkage System is a process that was designed in 1997 to improve academic performance for all students and to enhance work force quality by linking academic content standards to occupational skill standards. The Linkage System is based on research and development conducted by the Vocational-Technical Education Consortium of States (V-TECS). The system's key component is the "Taxonomy of Academic Performance Indicators," which was validated by 18 V-TECS member states through a rigorous review process. The Linkage System includes the following steps: (1) analyze the state-adopted content standards to identify the taxonomy skills that operationally define each mathematics, language arts, and science standard; (2) analyze occupational or vocational-technical program skill standards to identify academic taxonomy skills that are required for competent performance and that are known as related/required academic skills (RAS); (3) crosswalk the occupationally related academic skills to academic content standards; (4) develop instructional/assessment scenarios that include occupational and academic standards; and (5) load the cross-walked materials into the linkage system database (which is under development). The V-TECS system for linking academic content and standards provides rich instructional resources for vocational-technical and academic instructors. Identifying the academic skills required for competent workplace performance provides tools for enhancing the quality of workplace and academic performance. The updated

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Taxonomy of Academic Performance Indicators that is part of this document contains lists of basic/essential skills in secondary and postsecondary mathematics, language arts, and science, each of which has been assigned a reference code. (Most of the skills added for this edition are in the science domain.) (MN)

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ED 456 227

The Linkage System©: Linking Academic Content Standards and Occupational Skill Standards

AND

Taxonomy of Academic Performace Indicators: An Update of the V-TECS/ Snyder Basic/Essential Skills Taxonomy

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The Linkage System©

Linking Academic Content Standards and Occupational Skill Standards

A Process
to Enhance Workforce Quality
and
Improve Academic Performance

Ver 1.2

Charles Losh, Ph.D.

V-TECS
Southern Association of Colleges and Schools
Revised 2000

Abstract

The *Linkage System*© is a process designed in 1997 to improve academic performance for all students, and enhance workforce quality by linking academic content standards to occupational skill standards. Linking the results of standards development efforts and identifying academic content in an occupational context will provide a significant base of materials for contextual instruction and scenario development. Focused teacher in-service utilizes the results of the *Linkage System*© to develop contextual instruction materials to increase the numbers of students achieving high academic standards.

The Linkage System©

The Linkage System© has the potential to improve today's education and workforce preparation system, responding to challenges that include:

- National, state, and local concerns about the lack of skills required of the workforce, for both entering and incumbent workers
- National and state emphasis on "high" and "challenging" academic standards at all levels
- Continuing high dropout rates
- Academic instruction that does not relate to post high school lives
- Scarcity of workers with technical skills

System Research Base

The ***Taxonomy of Academic Performance Indicators*** (***TAPI***) (2000) is a revision of the ***Basic/Essential Skills Taxonomy*** (1989), developed by Dr. Lester Snyder at Arizona State University for a project sponsored by the Arizona Department of Education. The *Taxonomy* was validated by 18 V-TECS member states using a rigorous review process to verify the accuracy of the academic content. It was reviewed and revalidated with minor editions in 2000.

The *Taxonomy* was designed as an analysis tool that would provide a common, unambiguous academic vocabulary to analyze text and other curricular material. The academic skills listed in the *Taxonomy* are not designed as instructional/curriculum content, but as a descriptive listing of concepts. Each Mathematics, Language Arts, and Science skill is stated with precision, providing for the communication of academic skill requirements to assessment and curriculum developers.

Arizona, a member of V-TECS, contributed the *Taxonomy* to V-TECS in 1990 for use in member state occupational analysis projects. During the ensuing years, 1991 to date, the Mathematics, Language Arts, and Science skills required of competent workers in more than 40 occupations have been identified. Since adoption of the *Taxonomy* by the V-TECS Board of Directors as the basis of V-TECS's work in the academic arena, scores of subject matter specialists and academic instructors have participated in group processes to identify the academic skills they use to perform occupational specific duties and tasks.

Given its design, the Taxonomy is a unique tool that can be used to analyze not only occupations, but other content as well. The academic content standards analysis conducted by states such as Virginia, South Carolina, Arizona, Illinois, Maryland, and Maine exemplify the latest use of the Taxonomy. Use of this common vocabulary allows states to crosswalk existing and future Taxonomy based instructional products to their state's unique academic

standards. Ultimately, participating states will have access to a rich contextual instruction resource, the V-TECS database.

National initiatives include the analysis of the Cisco Networking Academy Program content and the ASE automotive technician tasks to identify academic skill requirements. Other national efforts are ongoing.

The Linkage System©

This system is based on research and development conducted by V-TECS and implemented in states across the nation. The key is the Taxonomy, the primary communication tool for this system. When used in conjunction with contextual statements developed around occupational skill standards and implemented using instructional scenarios, the potential for addressing differing learning styles is significant. Extensive research has been conducted on contextual instruction benefits to learning.

This research, coupled with the common sense notion that meaningful learning is better attended to and retained, only enhances this concept.

The *Linkage System*© includes the following steps:

1) Analyze the state adopted academic content standards to identify the *Taxonomy* skills that operationally define each Mathematics, Language Arts, and Science standard.

2) Analyze occupations or vocational-technical program skill standards to identify academic *Taxonomy* skills required for competent performance. These are called the "related/required academic skills" (RAS).

3) Crosswalk the occupational related academic skills to state academic content standards.

4) Develop instructional/assessment scenarios that include occupational and academic standards.

5) Load the cross-walked materials into the Linkage System database (under development).

Step 1: Analyze the state's academic content standards. Train the state's academic content experts (analysts) to use the system and related tools. There should be at least two experts in each area, given the need for discussion on the applicability of specific *Taxonomy* items to any given content standard. The analysis team receives information on the background of the *Taxonomy*, objectives of both the analysis and the further use of the materials once developed, and initial analysis of the standards. The teams then systematically review the standards, identifying the *Taxonomy* skills that operationally define each standard.

Step 2: Identify the related academic skills (RAS) required for competent performance in the occupation or vocational-technical program, assuming they have not been previously identified using the *Taxonomy*. In this part of the *Linkage System*, experts in the occupation/vocational-technical program, assisted by academic content experts, review all of the skill standards to determine the specific academic skills required of an expert performer for competent performance.

Step 3: Crosswalk the academic skills required for competent performance in the state's vocational-technical program to the state's academic content standards.

Step 4: Develop contextual statements that bring together the academic content standards and occupational skill standards using real life examples. Simply stated, contextual statements identify how specific academic skills are used or applied in the workplace. These are not abstract applications,

but rather, applications that learners (regardless of age) can identify as realistic. Development of contextual statements is accomplished through a group process designed to provide the training for writers to be able to develop the statements. A trained V-TECS facilitator leads the groups, with the primary concern of developing broad-based contextual examples that avoid trivial applications of the skill—"trivial" being defined as applications that only occur on rare occasions or are utilized by a very few employees in the occupation.

Contextualizing academic content standards provides for the improvement of both academic and occupational instruction, for these reasons:

- Vocational-Technical instructors can assure that the required academic content is included or imbedded in their instruction. This will provide opportunities for academic skill reinforcement for students enrolled in the occupational preparation program, and provide assurances to employers that the required academic content is covered in the program.
- Academic instructors will be able to use the statements as "context" for academic instruction, providing instruction that has more utility to the learner, and is more robust as a learning tool for the majority of students.
- Scenario developers will have a resource that can be used to assure that the scenarios developed for

instruction/assessment provide complete coverage of the technical and academic content.

- The role of vocational-technical education in helping students learn, retain, and achieve the state's academic content standards is further defined.

Linking academic and occupational skill standards provides a powerful tool for instructors in the development of contextual instructional and assessment materials. As reported by numerous authors (Bailey 1998, Bottoms [et al.] 1997, Raizen 1989, Smith [et al.] 1998, Stasz [et al.] 1993), contextual instruction provides significant improvements in learning and retention of instruction among learners of all age groups.

Once the contextual skills are identified for the occupation or vocational-technical program, they provide a significant resource base for dialog between vocational and academic instructors. This further facilitates the objective of integrating academic and vocational education.

Finally, the contextual materials furnish a base for developing scenarios that are rich in context and provide tools for instructors to deliver and assess student instruction. For a further discussion of scenario development, see ***Using Skill Standards for Vocational-Technical Education Curriculum Development*** (Losh, 2000).

Conclusion

The V-TECS system for linking academic content standards and occupational skill standards provides rich instructional resources for both vocational-technical and academic instructors. Identification of the academic skills required for competent workplace performance provides tools for enhancing the quality of both workforce and academic performance. Each area reinforces the other, and addresses one of the major challenges faced by educators—providing instruction that will improve student academic performance.

Use of the *Taxonomy* as an analysis tool is well established. Implementing the V-TECS *Linkage System* provides additional resources to improve instruction for all students, and will significantly enhance existing instructional resources.

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Taxonomy of Academic Performance Indicators

An update of the V-TECS/Snyder Basic/Essential Skills Taxonomy

July, 2000

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Taxonomy of Academic Performance Indicators

An Update of the V-TECS/Snyder
Basic/Essential Skills Taxonomy

Lester M. Snyder, Jr.

2000

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INTRODUCTION

Since the first edition of ***The Basic/Essential Skills Taxonomy*** was published, there has been extensive movement toward greater degrees of accountability throughout education. National and state educational leaders have joined efforts to enhance the quality of education. This leadership has undertaken to describe the knowledge required of students together with the levels of performance needed. The current approach uses standards as the label for indicating excellence. Standards are the mantra for indicating the performance levels that are the priority for most educational institutions. This state of affairs can be viewed as a challenge to educators or as an opportunity to exchange ideas with policymakers, parents, students and fellow educators. Focused dialogue can be encouraged while examining the balance between standards and quality education. Simply making schools, students and educators accountable is unlikely, on its own, to lead to improvements in performance even though this is a desirable policy. A viable vehicle is essential to begin the necessary dialogue.

The ***Taxonomy of Academic Performance Indicators*** (***TAPI***) is a revision of the ***Basic/Essential Skills Taxonomy***. The ***TAPI*** provides a means to analyze curriculum and instructional materials and to identify academic skills embedded in standards statements. ***TAPI*** is independent of the variety of formats and philosophical perspectives of the written materials. The ***TAPI*** also is a tool that can be used to facilitate discussion between educators, parents, business leaders and policymakers. When the ***TAPI*** is used in this manner, dialogue between these various groups can be focused.

The ***Taxonomy of Academic Performance Indicators*** identifies concepts inherent in the knowledge base in three academic areas: Language Arts, Mathematics and Science. The original publication, ***The Basic Skills/Essential Skills Taxonomy*** included a fourth area, Free Enterprise. This section is not included in the ***TAPI***, as the content tends to be idiosyncratic to regional needs and requirements.

Since the development of the first edition of the ***Taxonomy***, educators and policymakers at state and national levels have adopted different labels when referring to the broad area of excellence in education. When the first edition of the ***Taxonomy*** was published, educators commonly spoke of the basic academic skills as the major underpinning of this movement. The curriculum and the skills that all students should achieve was identified as basic. The first edition of the ***Basic/Essential Skills Taxonomy*** used lists of identified and adopted basic skills as well as syllabi and suggestions from content experts in the academic areas to determine the items to be included in the ***Taxonomy***. The compilation sought to be a comprehensive listing of the concepts inherent in the specific knowledge domain.

Ten years later, policymakers have shifted to Standards rather than basic skills as the focus for promoting excellence in education and for instilling a system that ensures accountability. Whether or not the ***Taxonomy*** could be a valid tool for analyzing standards was problematic. It seemed reasonable that while the nomenclature had changed, the major ideas or concepts included in the fields of knowledge had not changed extensively.

Studies were undertaken to examine whether or not the ***Taxonomy*** was a viable tool for analyzing standards. It was reasoned that, since the original ***Taxonomy*** categorized knowledge in selected fields, extensive additions should not be necessary.

Studies confirmed that the ***Taxonomy*** is a tool that can be used to analyze standards and continues to be a viable tool to be used in curriculum alignment projects and other studies designed to analyze curriculum materials.

In reviewing the ***Taxonomy*** for possible additions and revisions, several critical questions were identified. First, what changes should be made? This question drew attention to two central issues. The first issue focused on whether or not the original manuscript was sufficiently robust. That is, were the concepts included in the ***Taxonomy*** presented in sufficient depth? Since the original document used basic skills, conceivably these skills may have been too elementary and may not lend themselves to standards that are purported to be more sophisticated or more exhaustive than the knowledge domains included in the ***Basic/Essential Skills Taxonomy***.

Second, should the format and design of the ***Taxonomy*** be changed? Perhaps a revised format would make the ***Taxonomy*** more useful to analysts and curriculum developers. However, a drastic change in the design and format may render previous work with the document worthless since the concepts and numerical codes have been incorporated into curriculum materials in many states and numerous related agencies. A drastic change may render these numerical codes, at best, confusing.

Third, what additions and changes to conceptual items in the ***Taxonomy*** should be included? Four principles guided this examination. First, the extent that analysts used items from the ***Taxonomy*** needed to be examined. Inclusion was warranted if items were used in multiple analysis projects during the most recent five years. These projects typically focused on curriculum development and the analysis of competencies and objectives.

A second principle examined developments and recent findings in the knowledge domain. The extent of this change was determined by examining from the content included in textbooks of major publishers in the three domains as well as information gathered from content area experts. Five textbook series of widely used publishers were used as resources in this examination. Additionally, specialists in the content areas, judged whether or not the items were sufficiently comprehensive for the high school curriculum materials they taught and if new information should be included.

A third principle used the informed opinions of experienced analysts who identified items that they thought should be included in the ***Taxonomy***. Items suggested by these users were examined with particular attention given to reviewing whether or not the ellipsis could be used in the areas suggested.

Parsimony is the fourth principle used in examining the content to be included. In developing the original manuscript, considerable effort was made to ensure that the document did not become so extensive that its practical value would be limited. Therefore, new items were closely scrutinized to minimize the potential of a very voluminous manuscript.

After considering the four principles, no major changes were made to the original document. Some selected additions to the ***Taxonomy*** of Academic Performance Indicators were included. Most of the additional items are in the Science Domain. The use of these additional items can be beneficial in selected analysis projects.

The ***Taxonomy of Academic Performance Indicators*** (***TAPI***) can be used in a variety of ways. It can be used in:

- curriculum development
- curriculum analysis comparisons
- curriculum alignment
- dialogue between subject matter experts, policymakers, business and industry representatives and parents

The ***TAPI*** can be used in curriculum development projects. Used in this manner, the academic performance indicators to be mastered, either prior to taking a course or as outcomes of a course, are identified and agreed upon by the educator and student. Skills that are often referred to as prerequisite skills can be identified or, when used as an outcome measure for a course, expected outcomes or competencies can be explicated.

The ***TAPI*** can be used in making comparisons between curriculum materials that are presented in various formats; e.g., state-approved standards and subject matter syllabi.

Similarly, the ***TAPI*** can be used in aligning the curriculum offerings in a program of studies. This provides for an orderly progression through an identified set of competencies or objectives involving one or more subject areas in a program of studies. Alignment procedures are helpful in determining the degree of re-teaching that is desired or needed.

The ***TAPI*** also can be useful in focusing dialogue on the skills to be taught or on the level of mastery of the materials to be taught in a subject area. Communication regarding desired educational outcomes is imperative as local schools attempt to identify ways to ensure that outcomes are clearly understood by all parties. Educators can use the ***TAPI*** to communicate the most efficient sequence for delivering the academic content designed to meet identified standards.

Additionally, as schools use testing as a means of gauging accountability, the ***TAPI*** can be used to identify the academic performance indicators targeted for examination. Accountability testing demands that the academic content that the students are expected to learn are specified. The ***TAPI*** provides a vehicle for specifying these segments of knowledge.

Codes also are provided so that a relational database can be used in computer-assisted analyses. It is suggested that the database should be programmed to have key words appear when numeric codes are entered. This makes verification easier. The methodology for this electronic analysis is available from the author.

It is recommended that teams of coders be used when making an analysis. Coders need to be instructed in the format and design of the ***TAPI***. Experience with the process also indicates that subject matter experts be included on the analysis team. These individuals can provide guidance in the intricacies of the knowledge domain.

Supplement to the Introduction

The original ***V-TECS/Snyder Academic Skills Taxonomy*** (the ***Taxonomy***) was developed for a project sponsored by the Arizona Department of Education, under the direction of Dr. Lester Snyder at Arizona State University. The ***Taxonomy*** was designed as an analysis tool to be used with text and other curricular material to determine the specific academic content.

The developmental process included an analysis of the Arizona "Essential Skills", which was supplemented by an analysis of the "Basic", "Essential", or "Core" academic content standards from 17 additional member states of V-TECS. Each state's materials were analyzed to assure that the ***Taxonomy*** provided full coverage of the academic areas of mathematics, science, and language arts.

The ***Taxonomy*** was designed to provide a common, unambiguous academic skill vocabulary. The skills listed in the ***Taxonomy*** are not designed as instructional/curriculum content or standards, but as a descriptive academic skill listing. Each Mathematics, Language Arts, and Science skill is stated with precision, providing for the communication of academic skill requirements to assessment and curriculum developers. The ***Taxonomy*** provides a validated base for identifying the academic knowledge required for proficient skill performance in occupations or technical education fields.

Arizona, a member of V-TECS, contributed the ***Taxonomy*** to V-TECS in 1990 for use in the identification of academic skills for technical curriculum development. During the ensuing years, 1991 to date, the Mathematics, Language Arts, and Science skills required for more than 50 technical areas have been identified.

Mathematics Taxonomy

001	Calculates/Evaluates	Algebraic expressions	
002	Calculates/Evaluates	Common factors	
003	Calculates/Evaluates	Congruent	Triangles
004	Calculates/Evaluates	Factors	Whole numbers/divisibility
005	Calculates/Evaluates	Geometric figures	Area
006	Calculates/Evaluates	Geometric figures	Circumference
007	Calculates/Evaluates	Geometric figures	Perimeter
008	Calculates/Evaluates	Geometric figures	Surface area
009	Calculates/Evaluates	Geometric figures	Volume
010	Calculates/Evaluates	Least/common denominators	
011	Calculates/Evaluates	Least/common multiples	
012	Calculates/Evaluates	Linear relationship	Ordered pairs
013	Calculates/Evaluates	Mean/median/mode	
014	Calculates/Evaluates	Measurement	Precision
015	Calculates/Evaluates	Percent	In/decrease, markup/discount
016	Calculates/Evaluates	Prime factors	
017	Calculates/Evaluates	Prime numbers	
018	Calculates/Evaluates	Reasoning	Invalid arguments
019	Calculates/Evaluates	Statistics	
020	Calculates/Evaluates	Statistics	Test of hypotheses
021	Calculates/Evaluates	Unit measure	Price
022	Computes	Addition	Algebraic fractions
023	Computes	Addition	Binomials
024	Computes	Addition	Complex fractions
025	Computes	Addition	Complex numbers
026	Computes	Addition	Decimals
027	Computes	Addition	Fractions
028	Computes	Addition	Mentally
029	Computes	Addition	Mixed numbers
030	Computes	Addition	Monomials
031	Computes	Addition	Polynomials
032	Computes	Addition	Radicals
033	Computes	Addition	Rational expressions
034	Computes	Addition	Whole numbers
035	Computes	Division	Algebraic fractions
036	Computes	Division	Binomials
037	Computes	Division	Complex fractions
038	Computes	Division	Complex numbers
039	Computes	Division	Decimals
040	Computes	Division	Fractions
041	Computes	Division	Mentally
042	Computes	Division	Mixed numbers

043	Computes	Division	Monomials
044	Computes	Division	Polynomials
045	Computes	Division	Radicals
046	Computes	Division	Rational expressions
047	Computes	Division	Whole numbers
048	Computes	Equation of line	
049	Computes	Equations	
050	Computes	Equations	Absolute value
051	Computes	Exact values	Trigonometric function
052	Computes	Expected values	
053	Computes	Expected values	Formula
054	Computes	Expected values	Probabilties/decimals/ fractions/percents
055	Computes	Expected values	Two or more unrelated events
056	Computes	Factoring	
057	Computes	Factoring	Polynomials
058	Computes	Factoring	Quadratic equations
059	Computes	Inequalities	
060	Computes	Inequalities	Absolute value
061	Computes	Multiplication	Algebraic fractions
062	Computes	Multiplication	Binomials
063	Computes	Multiplication	Complex fractions
064	Computes	Multiplication	Complex numbers
065	Computes	Multiplication	Decimals
066	Computes	Multiplication	Fractions
067	Computes	Multiplication	Mentally
068	Computes	Multiplication	Mixed numbers
069	Computes	Multiplication	Monomials
070	Computes	Multiplication	Polynomials
071	Computes	Multiplication	Radicals
072	Computes	Multiplication	Rational expressions
073	Computes	Multiplication	Whole numbers
074	Computes	Polynomial functions	
075	Computes	Polynomial functions	Table of values
076	Computes	Rational expressions	

077	Computes	Slope of line	Intercept form
078	Computes	Square	Vertex
079	Computes	Square foot	
080	Computes	Subtraction	Algebraic fractions
081	Computes	Subtraction	Binomials
082	Computes	Subtraction	Complex fractions
083	Computes	Subtraction	Complex numbers
084	Computes	Subtraction	Decimals
085	Computes	Subtraction	Fractions
086	Computes	Subtraction	Mentally
087	Computes	Subtraction	Mixed numbers
088	Computes	Subtraction	Monomials
089	Computes	Subtraction	Polynomials
090	Computes	Subtraction	Radicals
091	Computes	Subtraction	Rational expressions
092	Computes	Subtraction	Whole numbers
093	Computes	Synthetic division	Polynomials
094	Constructs	Angles	
095	Constructs	Angles	Angle bisectors
096	Constructs	Angles	Congruent angles
097	Constructs	Charts/tables/graphs	
098	Constructs	Charts/tables/graphs	Data points
099	Constructs	Frequency tables	
100	Constructs	Geometric figures	
101	Constructs	Geometric figures	Compass/straight edge
102	Constructs	Geometric figures	Three dimensional figures
103	Constructs	Geometric figures	Transformation
104	Constructs	Graphs	
105	Constructs	Graphs	Cumulative frequency/computer
106	Constructs	Graphs of function	
107	Constructs	Graphs of function	Absolute functions
108	Constructs	Graphs of function	Inverse functions

109	Constructs	Graphs of function	Linear functions
110	Constructs	Graphs of function	Quadratic functions
111	Constructs	Graphs of function	Trigonometric functions
112	Constructs	Lines	
113	Constructs	Lines	Congruent segments
114	Constructs	Lines	Parallel/perpendicular
115	Converts	Angles	Degree/radian measurement
116	Converts	Decimals/fractions	ratios/percents
117	Converts	Formula	Equivalent form
118	Converts	Fractions	
119	Converts	Fractions	Mixed numbers
120	Converts	Fractions	Reciprocal form
121	Converts	Fractions	Simplest form
122	Converts	Radical form	Fractional exponents
123	Converts	Square units	
124	Converts	Units	
125	Converts	Units	Conversion rule
126	Converts	Units	Metric/English -- meters/feet, e.g.
127	Converts	Word problems	Mathematical expressions
128	Distinguishes	Angles/circles/arcs	
129	Distinguishes	Congruence/similarity	Geometric figures
130	Distinguishes	Deductive/inductive reasoning	
131	Distinguishes	Equal/not equal	
132	Distinguishes	Estimate/exact value	
133	Distinguishes	Proportion/congruence	
134	Distinguishes	Scientific/standard notion	
135	Distinguishes	Symmetry/transformation	
136	Estimates/Rounds	Angles	
137	Estimates/Rounds	Empirical probabilities	
138	Estimates/Rounds	Empirical probabilities	Population parameters
139	Estimates/Rounds	Expected outcomes	

140	Estimates/Rounds	Expected outcomes	Everyday occurrences
141	Estimates/Rounds	Geometric figures	Area
142	Estimates/Rounds	Geometric figures	Circumference
143	Estimates/Rounds	Geometric figures	Perimeter
144	Estimates/Rounds	Geometric figures	Volume
145	Estimates/Rounds	Geometric figures	Weight
146	Estimates/Rounds	Numbers	Add/subtract/divide/multiply
147	Estimates/Rounds	Random outcomes	Mathematical expectation
148	Estimates/Rounds	Reasonable answers	
149	Estimates/Rounds	Reasonable answers	Equations
150	Estimates/Rounds	Reasonable answers	Successive approximations
151	Estimates/Rounds	Square roots	
152	Estimates/Rounds	Values not given	Equation
153	Formulates/Verifies	Angles	
154	Formulates/Verifies	Angles	Acute/obtuse/right
155	Formulates/Verifies	Angles	Complementary
156	Formulates/Verifies	Angles	Supplementary
157	Formulates/Verifies	Arguments	Valid/invalid
158	Formulates/Verifies	Conclusions	
159	Formulates/Verifies	Questions	
160	Formulates/Verifies	Trigonometric identities	
161	Identifies	English measures	Length/volume/weight
162	Identifies	Fractions	Parts
163	Identifies	Function notations	
164	Identifies	Geometric figures	
165	Identifies	Geometric figure	Circles/angles/arcs/polygons
166	Identifies	Graphs of function	
167	Identifies	Lines	
168	Identifies	Lines	Parallel/perpendicular
169	Identifies	Lines	Rays/segment
170	Identifies	Lines	Vertical/horizontal
171	Identifies	Metric measures	Length/volume/weight
172	Identifies	Missing/irrelevant data	Word problems
173	Identifies	Statistics	Applications

174	Interprets	Charts/tables/graphs	
175	Interprets	Charts/tables/graphs	Functions
176	Interprets	Symbols	<, >, =, e.g.
177	Interprets	System of numbers	Place value
178	Interprets	System of numbers	Rational numbers, e.g. fractions
179	Measures	Direct	
180	Measures	Direct	Angles
181	Measures	Direct	Distance
182	Measures	Direct	Temperature
183	Measures	Direct	Time
184	Measures	Direct	Volume
185	Measures	Direct	Weight
186	Measures		Indirect
187	Measures	Indirect	Formulas
188	Measures	Metric	
189	Measures	Metric	Area
190	Measures	Metric	Distance
191	Measures	Metric	Temperature
192	Measures	Metric	Volume
193	Measures	Metric	Weight
194	Orders	Rational numbers	
195	Orders	Rational numbers	Number line
196	Solves equations	Exponential	
197	Solves equations	Exponential	Analytic
198	Solves equations	Exponential	Graphic
199	Solves equations	Linear	
200	Solves equations	Linear	Analytic
201	Solves equations	Linear	Graphic
202	Solves equations	Logarithmic	
203	Solves equations	Quadratic	
204	Solves equations	Quadratic	Quadratic formula

205	Solves equations	Systems of		
206	Solves equations	Systems of	Analytic	
207	Solves equations	Systems of	Graphic	
208	Solves equations	Systems of	Substitution	
209	Solves equations	Trigonometric		
210	Solves equations	Trigonometric	Analytic	
211	Solves equations	Trigonometric	Graphic	
212	Solves inequalities	Exponential		
213	Solves inequalities	Linear		
214	Solves inequalities	Linear	Analytic	
215	Solves inequalities	Linear	Graphic	
216	Solves inequalities	Quadratic		
217	Solves inequalities	Quadratic	Quadratic formula	
218	Solves inequalities	Systems of		
219	Solves inequalities	Systems of	Analytic	
220	Solves inequalities	Systems of	Graphic	
221	Solves problems	Absolute value		
222	Solves problems	Coordinate geometry		
223	Solves problems	Coordinate geometry	Conic sections	
224	Solves problems	Coordinate geometry	Distance formula	
225	Solves problems	Coordinate geometry	Equation of a line	
226	Solves problems	Formulas	Specified symbols	
227	Solves problems	Fractions/decimals/ratios/percents		
228	Solves problems	Fractions/decimals/ratios/percents		Direct/indirect variation
229	Solves problems	Generate conclusions	Deductive reasoning	
230	Solves problems	Proportion		
231	Solves problems	Proportion	Area	
232	Solves problems	Proportion	Volume	
233	Solves problems	Proportion	Weight	
234	Solves problems	Rational expressions		
235	Solves problems	Right triangles		
236	Solves problems	Right triangles	Cosines/sines/tangents	
237	Solves problems	Right triangles	Pythagorean theorem	
238	Solves problems	Trial and error		
239	Understands	Conditionals		
240	Understands	Definitions		
241	Understands	Definitions	Conditions	
242	Understands	Definitions	Standards	
243	Understands	Function concept		
244	Understands	Geometric figures	Visual perception	
245	Understands	Line/angle	Relationships	
246	Understands	Linear systems	Solutions	

247	Understands	Number theory	Arithmetic progression
248	Understands	Number theory	Counting arrangements
249	Understands	Number theory	Effect of extremes/mean
250	Understands	Number theory	Effect of extremes/median
251	Understands	Number theory	Effects of extremes/range
252	Understands	Number theory	Geometric progression
253	Understands	Number theory	Sequential outcomes
254	Understands	Order of operations	Rules
255	Understands	Power/exponent	
256	Understands	Statistics	
257	Understands	Statistics	Error of measure
258	Understands	Statistics	Probability
259	Understands	Statistics	Sampling
260	Understands	System of mathematics	Rational number system
261	Uses calculator	Addition	
262	Uses calculator	Division	
263	Uses calculator	Exponential functions	
264	Uses calculator	Formulas	
265	Uses calculator	Logarithmic functions	
266	Uses calculator	Multiplication	
267	Uses calculator	Radical numbers	
268	Uses calculator	Subtraction	
269	Uses calculator	Trigonometric functions	Cosines/sines/tangents
270	Calculates/Evaluates	Matrices	Addition
271	Calculates/Evaluates	Matrices	Subtraction
272	Calculates/Evaluates	Matrices	Multiplication
273	Calculates/Evaluates	Matrices	Inverse
274	Constructs	Graph of function	Inequalities
275	Solves	Quadratic equations	Square root
276	Solves	Equations	Absolute Value
277	Understands	Matrices	...
278	Uses	Calculator	Graphing

Language Arts Taxonomy

001	Adapts	Diction/structure	
002	Adapts	Diction/structure	Audience
003	Adapts	Diction/structure	Purpose
004	Adapts	Diction/structure	Situation
005	Adapts	Strategy	Listening
006	Adapts	Strategy	Reading
007	Adapts	Strategy	Speaking
008	Adapts	Strategy	Writing
009	Adapts	Style	
010	Adapts	Style	Audience
011	Adapts	Style	Cultural differences
012	Adapts	Style	Purpose
013	Applies/Uses	Definitions	
014	Applies/Uses	Figures of speech	
015	Applies/Uses	Figures of speech	Hyperbole
016	Applies/Uses	Figures of speech	Idiomatic expressions
017	Applies/Uses	Figures of speech	Metaphor
018	Applies/Uses	Figures of speech	Personification
019	Applies/Uses	Figures of speech	Simile
020	Applies/Uses	Study habits/methods	
021	Applies/Uses	Study habits/methods	Previewing
022	Applies/Uses	Study habits/methods	Prior knowledge
023	Applies/Uses	Study habits/methods	Skimming
024	Applies/Uses	Study habits/methods	Test-taking
025	Appreciates	Author's style/approach	
026	Appreciates	Author's style/approach	Characters
027	Appreciates	Author's style/approach	Imagery
028	Appreciates	Author's style/approach	Incidents/details
029	Appreciates	Author's style/approach	Language usage
030	Appreciates	Author's style/approach	Mood/tone
031	Appreciates	Author's style/approach	Organization/structure
032	Appreciates	Author's style/approach	Plot
033	Appreciates	Author's style/approach	Sequence
034	Appreciates	Author's style/approach	Setting

035	Attends	Directions/task	
036	Attends	Nonverbal cues	
037	Attends	Verbal cues	
038	Collects/Organizes	Information-oral/written	
039	Collects/Organizes	Information-oral/written	Classifications
040	Collects/Organizes	Information-oral/written	Discussions
041	Collects/Organizes	Information-oral/written	Library resources
042	Collects/Organizes	Information-oral/written	Notes
043	Collects/Organizes	Information-oral/written	Observations
044	Collects/Organizes	Information-oral/written	Outlines
045	Collects/Organizes	Information-oral/written	Personal experiences
046	Collects/Organizes	Information-oral/written	Reading
047	Collects/Organizes	Information-oral/written	Research -- formal
048	Composes/Edits	Agenda	
049	Composes/Edits	Audio-visual aids	
050	Composes/Edits	Audio-visual aids	Graphs
051	Composes/Edits	Bibliographies	
052	Composes/Edits	Drafts-oral/written	
053	Composes/Edits	Drafts-oral/written	Consistency
054	Composes/Edits	Drafts-oral/written	Extemporaneous
055	Composes/Edits	Drafts-oral/written	Originality
056	Composes/Edits	Drafts-oral/written	Sequence
057	Composes/Edits	Drafts-oral/written	Tone
058	Composes/Edits	Forms/documents	
059	Composes/Edits	Forms/documents	Classified ads
060	Composes/Edits	Forms/documents	College applications
061	Composes/Edits	Forms/documents	Financial applications
062	Composes/Edits	Forms/documents	Job applications
063	Composes/Edits	Forms/documents	Resumes
064	Composes/Edits	Forms/documents	Social Security applications
065	Composes/Edits	Forms/documents	W-4 forms
066	Composes/Edits	Forms/documents	Work permits
067	Composes/Edits	Journals/diaries	

068	Composes/Edits	Journals/diaries	Personal recollections
069	Composes/Edits	Notes	
070	Composes/Edits	Notes	Lecture
071	Composes/Edits	Oral presentations	
072	Composes/Edits	Oral presentations	Structure
073	Composes/Edits	Outlines	
074	Composes/Edits	Paragraphs	
075	Composes/Edits	Paragraphs	Cause/effect relationships
076	Composes/Edits	Paragraphs	Coherence
077	Composes/Edits	Paragraphs	Details
078	Composes/Edits	Paragraphs	Sequence
079	Composes/Edits	Paragraphs	Topic sentences/main idea
080	Composes/Edits	Paragraphs	Transitions
081	Composes/Edits	Poetry	
082	Composes/Edits	Poetry	Form
083	Composes/Edits	Poetry	Imagery
084	Composes/Edits	Poetry	Rhyme
085	Composes/Edits	Poetry	Rhythm
086	Composes/Edits	Poetry	Tone
087	Composes/Edits	Reports/essays	
088	Composes/Edits	Reports/essays	Editorials/opinions
089	Composes/Edits	Reports/essays	Evaluations/critiques
090	Composes/Edits	Reports/essays	Expositions
091	Composes/Edits	Reports/essays	Information requests
092	Composes/Edits	Reports/essays	Information supplying
093	Composes/Edits	Reports/essays	Narratives
094	Composes/Edits	Reports/essays	Persuasive text
095	Composes/Edits	Reports/essays	Proofs/revisions
096	Composes/Edits	Reports/essays	Research-formal
097	Composes/Edits	Reports/essays	Short stories/plays
098	Composes/Edits	Reports/essays	Summaries
099	Composes/Edits	Sentences	
100	Composes/Edits	Sentences	Adjectives
101	Composes/Edits	Sentences	Adverbs

102	Composes/Edits	Sentences	Capitalization
103	Composes/Edits	Sentences	Completeness
104	Composes/Edits	Sentences	Direction/indirect object
105	Composes/Edits	Sentences	Fragments-w/o
106	Composes/Edits	Sentences	Irregular expressions-w/o
107	Composes/Edits	Sentences	Modifiers
108	Composes/Edits	Sentences	Nouns
109	Composes/Edits	Sentences	Order of words
110	Composes/Edits	Sentences	Predicates
111	Composes/Edits	Sentences	Pronouns
112	Composes/Edits	Sentences	Punctuation
113	Composes/Edits	Sentences	Run-on-w/o
114	Composes/Edits	Sentences	Spelling
115	Composes/Edits	Sentences	Subject/verb agreement
116	Composes/Edits	Sentences	Subjects
117	Composes/Edits	Sentences	Verbs
118	Composes/Edits	Social communications/letters	
119	Composes/Edits	Social communications/letters	Business
120	Composes/Edits	Social communications/letters	Personal
121	Comprehends	Information-oral	
122	Comprehends	Information-oral	Assumptions/biases
123	Comprehends	Information-oral	Cause/effect relationships
124	Comprehends	Information-oral	Character traits
125	Comprehends	Information-oral	Comparisons/contrasts
126	Comprehends	Information-oral	Conclusions
127	Comprehends	Information-oral	Context
128	Comprehends	Information-oral	Main idea
129	Comprehends	Information-oral	Purpose
130	Comprehends	Information-oral	Rationale
131	Comprehends	Information-oral	Varied types
132	Comprehends	Information-written	
133	Comprehends	Information-written	Assumptions/biases
134	Comprehends	Information-written	Cause/effect relationships
135	Comprehends	Information-written	Character traits
136	Comprehends	Information-written	Charts/tables/graphs
137	Comprehends	Information-written	Comparisons/contrasts
138	Comprehends	Information-written	Conclusions
139	Comprehends	Information-written	Context
140	Comprehends	Information-written	Evaluations/critiques
141	Comprehends	Information-written	Main idea
142	Comprehends	Information-written	Mood

143	Comprehends	Information-written	Persuasive text
144	Comprehends	Information-written	Plot
145	Comprehends	Information-written	Purpose
146	Comprehends	Information-written	Rationale
147	Comprehends	Information-written	Sequence
148	Comprehends	Information-written	Setting
149	Comprehends	Information-written	Summaries
150	Describes/Explains	Grammar system	
151	Describes/Explains	Grammar system	Usage
152	Describes/Explains	Language	
153	Describes/Explains	Language	Families
154	Describes/Explains	Language	Origin/development
155	Describes/Explains	Language situations	
156	Describes/Explains	Language situations	Audience
157	Describes/Explains	Language situations	Purpose
158	Describes/Explains	New words	Origin/development
159	Describes/Explains	Perceptual effects	
160	Describes/Explains	Perceptual effects	Assumptions/biases
161	Describes/Explains	Perceptual effects	Emotional tone
162	Describes/Explains	Perceptual effects	Euphemisms
163	Describes/Explains	Perceptual effects	Irony/satire
164	Describes/Explains	Perceptual effects	Propaganda techniques
165	Describes/Explains	Perceptual effects	Stereotypes
166	Describes/Explains	Purpose/strategy	Word groups
167	Evaluates	Information-oral	
168	Evaluates	Information-oral	Adequacy/sufficiency
169	Evaluates	Information-oral	Appropriateness
170	Evaluates	Information-oral	Clarity
171	Evaluates	Information-oral	Conclusions/solutions
172	Evaluates	Information-oral	Fact/opinion
173	Evaluates	Information-oral	Non-print media
174	Evaluates	Information-oral	Propaganda techniques
175	Evaluates	Information-oral	Reality/fantasy
176	Evaluates	Information-oral	Relationship of ideas
177	Evaluates	Information-oral	Relevant/irrelevant

178	Evaluates	Information-oral	Sources
179	Evaluates	Information-oral	Validity
180	Evaluates	Information-written	
181	Evaluates	Information-written	Adequacy/sufficiency
182	Evaluates	Information-written	Appropriateness
183	Evaluates	Information-written	Clarity
184	Evaluates	Information-written	Conclusions/solutions
185	Evaluates	Information-written	Fact/opinion
186	Evaluates	Information-written	Propaganda techniques
187	Evaluates	Information-written	Reality/fantasy
188	Evaluates	Information-written	Relationship of ideas
189	Evaluates	Information-written	Relevant/irrelevant
190	Evaluates	Information-written	Sources
191	Evaluates	Information-written	Validity
192	Identifies	Function of words	
193	Identifies	Function of words	Adjectives/adverbs
194	Identifies	Function of words	Direct/indirect object
195	Identifies	Function of words	Nouns/verbs
196	Identifies	Function of words	Phrases/clauses
197	Identifies	Function of words	Prepositions/conjunctions
198	Identifies	Function of words	Subject/predicate
199	Identifies	Information-oral	
200	Identifies	Information-oral	Assumptions/biases
201	Identifies	Information-oral	Context
202	Identifies	Information-oral	Dialects
203	Identifies	Information-oral	Emotional tone
204	Identifies	Information-oral	Euphemisms
205	Identifies	Information-oral	Explicit/implicit
206	Identifies	Information-oral	Irony/satire
207	Identifies	Information-oral	Key words/phrases
208	Identifies	Information-oral	Main idea
209	Identifies	Information-oral	Mood/tone
210	Identifies	Information-oral	Outcomes/solutions
211	Identifies	Information-oral	Prior knowledge
212	Identifies	Information-oral	Propaganda techniques
213	Identifies	Information-oral	Stereotypes
214	Identifies	Information-written	
215	Identifies	Information-written	Abbreviations
216	Identifies	Information-written	Assumptions/biases

217	Identifies	Information-written	Context
218	Identifies	Information-written	Dialects
219	Identifies	Information-written	Emotional tone
220	Identifies	Information-written	Euphemisms
221	Identifies	Information-written	Explicit/implicit
222	Identifies	Information-written	Fiction/non-fiction
223	Identifies	Information-written	Irony/satire
224	Identifies	Information-written	Key words/phrases
225	Identifies	Information-written	Main idea
226	Identifies	Information-written	Mood/tone
227	Identifies	Information-written	Outcomes/solutions
228	Identifies	Information-written	Propaganda techniques
229	Identifies	Information-written	Stereotypes
230	Identifies	Point of view	First/third person
231	Identifies	Purpose/strategy	
232	Identifies	Purpose/strategy	Listening
233	Identifies	Purpose/strategy	Reading
234	Identifies	Purpose/strategy	Speaking
235	Identifies	Purpose/strategy	Writing
236	Infers/Predicts	Information-oral	
237	Infers/Predicts	Information-oral	Assumptions/biases
238	Infers/Predicts	Information-oral	Cause/effect relationships
239	Infers/Predicts	Information-oral	Character traits
240	Infers/Predicts	Information-oral	Comparisons/contrasts
241	Infers/Predicts	Information-oral	Context
242	Infers/Predicts	Information-oral	Details
243	Infers/Predicts	Information-oral	Main idea
244	Infers/Predicts	Information-oral	Outcomes/solutions
245	Infers/Predicts	Information-oral	Purpose
246	Infers/Predicts	Information-oral	Rationale
247	Infers/Predicts	Information-written	
248	Infers/Predicts	Information-written	Assumptions/biases
249	Infers/Predicts	Information-written	Cause/effect relationships
250	Infers/Predicts	Information-written	Character traits
251	Infers/Predicts	Information-written	Comparisons/contrasts
252	Infers/Predicts	Information-written	Context
253	Infers/Predicts	Information-written	Details
254	Infers/Predicts	Information-written	Main idea
255	Infers/Predicts	Information-written	Mood/tone
256	Infers/Predicts	Information-written	Outcomes/solutions

257	Infers/Predicts	Information-written	Plot/setting
258	Infers/Predicts	Information-written	Purpose
259	Infers/Predicts	Information-written	Rational
260	Infers/Predicts	Information-written	Sequence
261	Presents	Formal speech	
262	Presents	Formal speech	Expository
263	Presents	Formal speech	Persuasive
264	Presents	Informal speech	
265	Presents	Informal speech	Discussion
266	Presents	Informal speech	Information requests
267	Presents	Informal speech	Information supplying
268	Presents	Informal speech	Interpretation
269	Presents	Informal speech	Interview
270	Presents	Informal speech	Persuasive
271	Uses	Dictionary	
272	Uses	Library resources	
273	Uses	Library resources	Almanacs/yearbooks
274	Uses	Library resources	Atlases
275	Uses	Library resources	Card catalogs
276	Uses	Library resources	Encyclopedia
277	Uses	Library resources	Guides
278	Uses	Text resources	
279	Uses	Text resources	Glossaries
280	Uses	Text resources	Indexes
281	Uses	Text resources	Table of contents
282	Uses	Thesaurus	

Science Taxonomy

001	Analyzes/Evaluates	Chemicals in society	
002	Analyzes/Evaluates	Chemicals in society	Drugs
003	Analyzes/Evaluates	Chemicals in society	Fertilizers
004	Analyzes/Evaluates	Chemicals in society	Food additives
005	Analyzes/Evaluates	Chemicals in society	MSG
006	Analyzes/Evaluates	Chemicals in society	Vitamins
007	Analyzes/Evaluates	Environmental issues	
008	Analyzes/Evaluates	Environmental issues	Ecology
009	Analyzes/Evaluates	Environmental issues	Impact statements
010	Analyzes/Evaluates	Environmental issues	Media information
011	Analyzes/Evaluates	Environmental issues	Pollution
012	Analyzes/Evaluates	Environmental issues	Waste management
013	Analyzes/Evaluates	Experiments	
014	Analyzes/Evaluates	Experiments	Conclusions
015	Analyzes/Evaluates	Experiments	Conflicting data
016	Analyzes/Evaluates	Experiments	Controls
017	Analyzes/Evaluates	Experiments	Data
018	Analyzes/Evaluates	Experiments	Inferences
019	Analyzes/Evaluates	Experiments	Limitations
020	Analyzes/Evaluates	Experiments	Operational
021	Analyzes/Evaluates	Experiments	Questions
022	Analyzes/Evaluates	Experiments	Replications
023	Analyzes/Evaluates	Experiments	Samples
024	Analyzes/Evaluates	Experiments	Sources of errors
025	Analyzes/Evaluates	Experiments	Variables
026	Analyzes/Evaluates	Natural resources	
027	Analyzes/Evaluates	Natural resources	Allocation
028	Analyzes/Evaluates	Natural resources	Recovery
029	Analyzes/Evaluates	Natural resources	Renewable/nonrenewable
030	Analyzes/Evaluates	Natural resources	Utilization
031	Analyzes/Evaluates	Science technology	
032	Analyzes/Evaluates	Science technology	Implications-economic
033	Analyzes/Evaluates	Science technology	Implications-political
034	Analyzes/Evaluates	Science technology	Implications-social
035	Analyzes/Evaluates	Science technology	Products, e.g., Petroleum/textiles
036	Analyzes/Evaluates	Science technology	Societal influences

037	Applies/Uses	Classification schemes	
038	Applies/Uses	Classification schemes	Kingdom, phylum, etc.
039	Applies/Uses	Laboratory instruments	
040	Applies/Uses	Laboratory techniques	
041	Applies/Uses	Laboratory techniques	Safety
042	Applies/Uses	Maps/charts/tables/graphs	
043	Applies/Uses	Models/theories/laws	
044	Applies/Uses	Scientific methods	
045	Applies/Uses	Scientific methods	Analysis-qualitative/ quantitative
046	Applies/Uses	Scientific methods	Data gathering
047	Applies/Uses	Scientific methods	Observation-direct/ indirect
048	Applies/Uses	Scientific methods	Predictions
049	Applies/Uses	Scientific methods	Problem identification
050	Applies/Uses	Scientific notation	
051	Classifies	Matter	
052	Converts	Measurement units	
053	Describes/Explains	Acids/bases	
054	Describes/Explains	Acids/bases	Acid indicators
055	Describes/Explains	Acids/bases	Base indicators
056	Describes/Explains	Acids/bases	Ions
057	Describes/Explains	Acids/bases	Neutralization/salts
058	Describes/Explains	Acids/bases	pH
059	Describes/Explains	Atoms	
060	Describes/Explains	Atoms	Bonding
061	Describes/Explains	Atoms	Chemical equations
062	Describes/Explains	Atoms	Chemical formulas
063	Describes/Explains	Atoms	Composition, e.g., electrons, Protons, neutrons
064	Describes/Explains	Atoms	Mass
065	Describes/Explains	Atoms	Number
066	Describes/Explains	Atoms	Structure
067	Describes/Explains	Atoms	Weight
068	Describes/Explains	Bacteria	

069	Describes/Explains	Bacteria	Benefits
070	Describes/Explains	Bacteria	Characteristics
071	Describes/Explains	Bacteria	Protein production
072	Describes/Explains	Bacteria	Resistance to drugs
073	Describes/Explains	Biochemistry	
074	Describes/Explains	Biochemistry	ATP/ADP
075	Describes/Explains	Biochemistry	Body heat
076	Describes/Explains	Biochemistry	Cell respiration
077	Describes/Explains	Biochemistry	Cellulose
078	Describes/Explains	Biochemistry	Chlorophyll
079	Describes/Explains	Biochemistry	Fermentation
080	Describes/Explains	Biochemistry	Food energy pyramid
081	Describes/Explains	Biochemistry	Phosphate groups
082	Describes/Explains	Biochemistry	Photosynthesis
083	Describes/Explains	Biochemistry	Protein synthesis
084	Describes/Explains	Biochemistry	Simple sugar
085	Describes/Explains	Carbon/organic chemistry	
086	Describes/Explains	Carbon/organic chemistry	Alkane series
087	Describes/Explains	Carbon/organic chemistry	Alkene series
088	Describes/Explains	Carbon/organic chemistry	Alkyne series
089	Describes/Explains	Carbon/organic chemistry	Amino acids
090	Describes/Explains	Carbon/organic chemistry	Carbohydrates
091	Describes/Explains	Carbon/organic chemistry	Compounds
092	Describes/Explains	Carbon/organic chemistry	Cyclichydrocarbons
093	Describes/Explains	Carbon/organic chemistry	Fats
094	Describes/Explains	Carbon/organic chemistry	Glucose
095	Describes/Explains	Carbon/organic chemistry	Hydrocarbons-derivatives
096	Describes/Explains	Carbon/organic chemistry	Hydrocarbons-- saturated/unsaturated
097	Describes/Explains	Carbon/organic chemistry	Isomers
098	Describes/Explains	Carbon/organic chemistry	Lipids
099	Describes/Explains	Carbon/organic chemistry	Polyatomic ion
100	Describes/Explains	Carbon/organic chemistry	Proteins
101	Describes/Explains	Carbon/organic chemistry	Tetrahedron
102	Describes/Explains	Carbon/organic chemistry	Vitamins
103	Describes/Explains	Cells	
104	Describes/Explains	Cells	Diffusion
105	Describes/Explains	Cells	Division
106	Describes/Explains	Cells	Eukaryotes
107	Describes/Explains	Cells	Homeostasis

108	Describes/Explains	Cells	Osmosis
109	Describes/Explains	Cells	Parts/functions
110	Describes/Explains	Cells	Photosynthesis/ATP
111	Describes/Explains	Cells	Prokaryotes
112	Describes/Explains	Cells	Respiration
113	Describes/Explains	Cells	Transport-active/passive
114	Describes/Explains	Chemical reactions	
115	Describes/Explains	Chemical reactions	Activation energy
116	Describes/Explains	Chemical reactions	Catalysts
117	Describes/Explains	Chemical reactions	Concentration
118	Describes/Explains	Chemical reactions	Endothermic
119	Describes/Explains	Chemical reactions	Energy changes
120	Describes/Explains	Chemical reactions	Exothermic
121	Describes/Explains	Chemical reactions	Inhibitors
122	Describes/Explains	Chemical reactions	Mole
123	Describes/Explains	Chemical reactions	Reactants
124	Describes/Explains	Color	
125	Describes/Explains	Color	Blindness
126	Describes/Explains	Color	Cones
127	Describes/Explains	Color	Pigmentation
128	Describes/Explains	Color	Rainbow
129	Describes/Explains	Color	Rods
130	Describes/Explains	Color	Spectrum
131	Describes/Explains	Conservation	
132	Describes/Explains	Conservation	Energy
133	Describes/Explains	Conservation	Matter
134	Describes/Explains	Conservation	Minerals
135	Describes/Explains	Conservation	Soil
136	Describes/Explains	Conservation	Water
137	Describes/Explains	Conservation	Wildlife
138	Describes/Explains	Earth	
139	Describes/Explains	Earth	Climate
140	Describes/Explains	Earth	Closed system
141	Describes/Explains	Earth	Composition/structure
142	Describes/Explains	Earth	Crust
143	Describes/Explains	Earth	Erosion/weathering
144	Describes/Explains	Earth	Gravity
145	Describes/Explains	Earth	Latitude-temperature zones
146	Describes/Explains	Earth	Longitude-time zones

147	Describes/Explains	Earth	Mineral cycle
148	Describes/Explains	Earth	Movement, e.g., earthquakes
149	Describes/Explains	Earth	Natural resources
150	Describes/Explains	Earth	Rock cycles
151	Describes/Explains	Earth	Shape
152	Describes/Explains	Earth	Water
153	Describes/Explains	Earth history	
154	Describes/Explains	Earth history	Age/composition
155	Describes/Explains	Earth history	Dating
156	Describes/Explains	Earth history	Eras
157	Describes/Explains	Earth history	Fossils/rocks
158	Describes/Explains	Earth history	Superposition
159	Describes/Explains	Ecology	
160	Describes/Explains	Ecology	Biomes
161	Describes/Explains	Ecology	Community
162	Describes/Explains	Ecology	Consumers/producers
163	Describes/Explains	Ecology	Decomposers
164	Describes/Explains	Ecology	Ecosystem
165	Describes/Explains	Ecology	Entropy
166	Describes/Explains	Ecology	Food chain
167	Describes/Explains	Ecology	Food webs
168	Describes/Explains	Ecology	Fossil fuels
169	Describes/Explains	Ecology	Habitats
170	Describes/Explains	Ecology	Herbivores/omnivores/carnivores
171	Describes/Explains	Ecology	Niches
172	Describes/Explains	Ecology	Population
173	Describes/Explains	Ecology	Predators
174	Describes/Explains	Ecology	Succession
175	Describes/Explains	Ecology	Survival mechanisms
176	Describes/Explains	Ecosystems	
177	Describes/Explains	Electricity	
178	Describes/Explains	Electricity	Batteries
179	Describes/Explains	Electricity	Charging
180	Describes/Explains	Electricity	Conductors/insulators
181	Describes/Explains	Electricity	Coulomb's law
182	Describes/Explains	Electricity	Currents-direct/alternating
183	Describes/Explains	Electricity	Friction
184	Describes/Explains	Electricity	Ground
185	Describes/Explains	Electricity	Lightning
186	Describes/Explains	Electricity	Parallel/series circuits

187	Describes/Explains	Electricity	Short circuit
188	Describes/Explains	Electricity	Static
189	Describes/Explains	Electricity	Transistor
190	Describes/Explains	Electricity	Vacuum tube
191	Describes/Explains	Electricity-generating	
192	Describes/Explains	Electricity-generating	Hydroelectric
193	Describes/Explains	Electricity-generating	Incandescent
194	Describes/Explains	Electricity-generating	Motors
195	Describes/Explains	Electricity-generating	Solar
196	Describes/Explains	Electricity-generating	Steam, e.g., nuclear
197	Describes/Explains	Electricity-generating	Transformers
198	Describes/Explains	Electricity-measurement	
199	Describes/Explains	Electricity-measurement	Ammeter/voltmeter
200	Describes/Explains	Electricity-measurement	Ampere
201	Describes/Explains	Electricity-measurement	Fuse
202	Describes/Explains	Electricity-measurement	Galvanometer
203	Describes/Explains	Electricity-measurement	Ohm's law
204	Describes/Explains	Electricity-measurement	Resistance
205	Describes/Explains	Electricity-measurement	Voltage
206	Describes/Explains	Electrochemical energy	
207	Describes/Explains	Electrochemical energy	Anode
208	Describes/Explains	Electrochemical energy	Cathode
209	Describes/Explains	Electrochemical energy	Electrolysis
210	Describes/Explains	Electrochemical energy	Types- -cells, batteries, elec-
trodes			
211	Describes/Explains	Electrochemical reactions	
212	Describes/Explains	Electrochemical reactions	Activity of metals
213	Describes/Explains	Electrochemical reactions	Oxidation/reduction
214	Describes/Explains	Electromagnetism	
215	Describes/Explains	Electromagnetism	Coil
216	Describes/Explains	Electromagnetism	Earth
217	Describes/Explains	Electromagnetism	Magnetic fields/force
218	Describes/Explains	Electromagnetism	Magnetic poles
219	Describes/Explains	Electromagnetism	Magnets
220	Describes/Explains	Electrons	
221	Describes/Explains	Electrons	Chemical bonding
222	Describes/Explains	Electrons	Covalent bonding
223	Describes/Explains	Electrons	Electric charges

224	Describes/Explains	Electrons	Ionic bonds
225	Describes/Explains	Electrons	Magnets
226	Describes/Explains	Elements/compounds	
227	Describes/Explains	Elements/compounds	Atomic number/weight
228	Describes/Explains	Elements/compounds	Bonding
229	Describes/Explains	Elements/compounds	Catalysts
230	Describes/Explains	Elements/compounds	Combustion
231	Describes/Explains	Energy	
232	Describes/Explains	Energy	Conversion
233	Describes/Explains	Energy	Kinetic/potential
234	Describes/Explains	Energy	Law of conservation
235	Describes/Explains	Energy	Mechanical
236	Describes/Explains	Energy	Momentum
237	Describes/Explains	Energy	Power
238	Describes/Explains	Energy	Theory of relativity
239	Describes/Explains	Energy	Thermal
240	Describes/Explains	Energy/resources	
241	Describes/Explains	Energy/resources	Fossils
242	Describes/Explains	Energy/resources	Gases
243	Describes/Explains	Energy/resources	Geothermal
244	Describes/Explains	Energy/resources	Nuclear
245	Describes/Explains	Energy/resources	Solar
246	Describes/Explains	Energy/resources	Water/tides
247	Describes/Explains	Energy/Resources	Wind
248	Describes/Explains	Force	
249	Describes/Explains	Force	Balanced/unbalanced
250	Describes/Explains	Force	Centrifugal/centripetal
251	Describes/Explains	Force	Friction
252	Describes/Explains	Force	Gravity
253	Describes/Explains	Force	Inertia
254	Describes/Explains	Force	Mass
255	Describes/Explains	Force	Pressure
256	Describes/Explains	Force	Weight
257	Describes/Explains	Force	Work
258	Describes/Explains	Fuels	
259	Describes/Explains	Fuels	Fractional distillation
260	Describes/Explains	Fuels	Internal/external combustion

261	Describes/Explains	Genetics	
262	Describes/Explains	Genetics	Chromosomes
263	Describes/Explains	Genetics	Diversity
264	Describes/Explains	Genetics	DNA
265	Describes/Explains	Genetics	Dominant/recessive
266	Describes/Explains	Genetics	Genes
267	Describes/Explains	Genetics	Genotype/phenotype
268	Describes/Explains	Genetics	Inheritance
269	Describes/Explains	Genetics	Mitosis/meiosis
270	Describes/Explains	Genetics	Mutations
271	Describes/Explains	Genetics	Punnett square
272	Describes/Explains	Genetics	Zygote
273	Describes/Explains	Heat	
274	Describes/Explains	Heat	Conduction/convection
275	Describes/Explains	Heat	Coolant
276	Describes/Explains	Heat	Diffusion/transformation
277	Describes/Explains	Heat	Expansion/contraction
278	Describes/Explains	Heat	Fusion/vaporization
279	Describes/Explains	Heat	Infrared
280	Describes/Explains	Heat	Insulation
281	Describes/Explains	Heat	Radiation
282	Describes/Explains	Heat	Temperature
283	Describes/Explains	Human/animal	
284	Describes/Explains	Human/animal	Aging
285	Describes/Explains	Human/animal	Blood cells/platelets
286	Describes/Explains	Human/animal	Blood/blood pressure
287	Describes/Explains	Human/animal	Cardiovascular system
288	Describes/Explains	Human/animal	Circulatory system
289	Describes/Explains	Human/animal	Development
290	Describes/Explains	Human/animal	Digestive system
291	Describes/Explains	Human/animal	Diseases
292	Describes/Explains	Human/animal	Endocrine system
293	Describes/Explains	Human/animal	Excretory system
294	Describes/Explains	Human/animal	Hemoglobin
295	Describes/Explains	Human/animal	Homeostasis
296	Describes/Explains	Human/animal	Hormones
297	Describes/Explains	Human/animal	Immune system
298	Describes/Explains	Human/animal	Maintenance/management
299	Describes/Explains	Human/animal	Metabolism
300	Describes/Explains	Human/animal	Muscular system
301	Describes/Explains	Human/animal	Nervous system
302	Describes/Explains	Human/animal	Organs/transplants

303	Describes/Explains	Human/animal	Plasma
304	Describes/Explains	Human/animal	Reproductive system
305	Describes/Explains	Human/animal	Respiratory system
306	Describes/Explains	Human/animal	Skeletal system
307	Describes/Explains	Human/animal	Skin
308	Describes/Explains	Human/animal	Tissues
309	Describes/Explains	Human/animal	Weight gain/loss
310	Describes/Explains	Kingdoms	
311	Describes/Explains	Kingdoms	Animalia
312	Describes/Explains	Kingdoms	Fungi
313	Describes/Explains	Kingdoms	Monera
314	Describes/Explains	Kingdoms	Plantae
315	Describes/Explains	Kingdoms	Protista
316	Describes/Explains	Lenses	
317	Describes/Explains	Lenses	Concave/convex
318	Describes/Explains	Lenses	Focal length
319	Describes/Explains	Lenses	Human eye
320	Describes/Explains	Light	
321	Describes/Explains	Light	Angle of incidence/reflection
322	Describes/Explains	Light	Critical angle-fiber optics
323	Describes/Explains	Light	Diffraction
324	Describes/Explains	Light	Electromagnetic radiation
325	Describes/Explains	Light	Electromagnetic spectrum
326	Describes/Explains	Light	Florescent
327	Describes/Explains	Light	Incandescent
328	Describes/Explains	Light	Lasers
329	Describes/Explains	Light	Opaque
330	Describes/Explains	Light	Photoelectric
331	Describes/Explains	Light	Photons
332	Describes/Explains	Light	Polarization
333	Describes/Explains	Light	Refraction
334	Describes/Explains	Light	Speed
335	Describes/Explains	Light	Translucent/transparent
336	Describes/Explains	Light	Ultraviolet
337	Describes/Explains	Matter	
338	Describes/Explains	Matter	Density
339	Describes/Explains	Matter	Divisibility
340	Describes/Explains	Matter	Motion/inertia
341	Describes/Explains	Matter	Phases/states

342	Describes/Explains	Matter	Properties
343	Describes/Explains	Matter	Structure
344	Describes/Explains	Matter	Substance
345	Describes/Explains	Matter	Uses
346	Describes/Explains	Mixtures	
347	Describes/Explains	Molecules	
348	Describes/Explains	Motion	
349	Describes/Explains	Motion	Acceleration/deceleration
350	Describes/Explains	Motion	Action/reaction
351	Describes/Explains	Motion	Circular
352	Describes/Explains	Motion	Laws
353	Describes/Explains	Motion	Projectile
354	Describes/Explains	Motion	Speed
355	Describes/Explains	Motion	Velocity
356	Describes/Explains	Motion	Vibrations/waves
357	Describes/Explains	Oceans	
358	Describes/Explains	Oceans	Circulation
359	Describes/Explains	Oceans	Currents
360	Describes/Explains	Oceans	Resources
361	Describes/Explains	Oceans	Structure, e.g., floor, reefs
362	Describes/Explains	Oceans	Tides
363	Describes/Explains	Oceans	Water cycle
364	Describes/Explains	Oceans	Waves
365	Describes/Explains	Organisms	
366	Describes/Explains	Organisms	Adaptation
367	Describes/Explains	Organisms	Development
368	Describes/Explains	Organisms	Energy capture/release
369	Describes/Explains	Organisms	Life cycle
370	Describes/Explains	Organisms	Reproduction
371	Describes/Explains	Periodic table	
372	Describes/Explains	Periodic table	Families
373	Describes/Explains	Periodic table	Metallic luster
374	Describes/Explains	Periodic table	Metalloids
375	Describes/Explains	Periodic table	Non-metals
376	Describes/Explains	Periodic table	Properties
377	Describes/Explains	Periodic table	Transition metals

378	Describes/Explains	Plants	
379	Describes/Explains	Plants	Fertilization
380	Describes/Explains	Plants	Nitrogen cycle
381	Describes/Explains	Plants	Oxygen/carbon dioxide cycle
382	Describes/Explains	Plants	Parts/functions
383	Describes/Explains	Plants	Photosynthesis
384	Describes/Explains	Plants	Pollen
385	Describes/Explains	Plants	Propagation
386	Describes/Explains	Plants	Pruning
387	Describes/Explains	Plants	Temperature-role of
388	Describes/Explains	Plants	Water
389	Describes/Explains	Solutions	
390	Describes/Explains	Solutions	Distillation
391	Describes/Explains	Solutions	Polar/non-polar
392	Describes/Explains	Solutions	Saturated/unsaturated
393	Describes/Explains	Solutions	Soluble/insoluble
394	Describes/Explains	Solutions	Solute
395	Describes/Explains	Solutions	Solvent
396	Describes/Explains	Sound	
397	Describes/Explains	Sound	Amplification
398	Describes/Explains	Sound	Audible range
399	Describes/Explains	Sound	Carriers/insulators
400	Describes/Explains	Sound	Compression
401	Describes/Explains	Sound	Controls
402	Describes/Explains	Sound	Decibels/intensity
403	Describes/Explains	Sound	Doppler effect
404	Describes/Explains	Sound	Frequency-hertz
405	Describes/Explains	Sound	Hearing
406	Describes/Explains	Sound	Noise/acoustics
407	Describes/Explains	Sound	Overtones/harmonies
408	Describes/Explains	Sound	Pitch/frequency
409	Describes/Explains	Sound	Quality
410	Describes/Explains	Sound	Reflection/interference
411	Describes/Explains	Sound	Resonance
412	Describes/Explains	Sound	Retraction/diffraction
413	Describes/Explains	Sound	Speed
414	Describes/Explains	Sound	Vocal cords
415	Describes/Explains	Sound	Waves-pitch frequency
416	Describes/Explains	Theory of evolution	
417	Describes/Explains	Universe	

418	Describes/Explains	Universe	Asteroids/meteors/meteorites
419	Describes/Explains	Universe	Big Bang Theory
420	Describes/Explains	Universe	Comets
421	Describes/Explains	Universe	Eclipses-lunar/solar
422	Describes/Explains	Universe	Galaxies
423	Describes/Explains	Universe	Light year
424	Describes/Explains	Universe	Lunar cycles
425	Describes/Explains	Universe	Lunar phases
426	Describes/Explains	Universe	Moons
427	Describes/Explains	Universe	Planets
428	Describes/Explains	Universe	Solar system
429	Describes/Explains	Universe	Stars
430	Describes/Explains	Universe	Sun
431	Describes/Explains	Weather/climate	
432	Describes/Explains	Weather/climate	Air mass
433	Describes/Explains	Weather/climate	Altitude
434	Describes/Explains	Weather/climate	Atmosphere
435	Describes/Explains	Weather/climate	Barometric pressure
436	Describes/Explains	Weather/climate	Clouds
437	Describes/Explains	Weather/climate	Dew point
438	Describes/Explains	Weather/climate	Fronts
439	Describes/Explains	Weather/climate	Greenhouse effect
440	Describes/Explains	Weather/climate	Jet stream
441	Describes/Explains	Weather/climate	Ozone layer
442	Describes/Explains	Weather/climate	Precipitation
443	Describes/Explains	Weather/climate	Relative humidity
444	Describes/Explains	Weather/climate	Wind
445	Describes/Explains	Work	
446	Describes/Explains	Work	Inclined planes-edges/screws
447	Describes/Explains	Work	Levers
448	Describes/Explains	Work	Pulleys
449	Identifies	Acids/bases	
450	Identifies	Animals	
451	Identifies	Compounds-inorganic	
452	Identifies	Compounds-organic	
453	Identifies	Compounds-organic	Acid rain
454	Identifies	Compounds-organic	Chemical equations
455	Identifies	Compounds-organic	Chemical reactions
456	Identifies	Compounds-organic	Classes

457	Identifies	Compounds-organic	Hydrocarbons
458	Identifies	Compounds-organic	Suffixes
459	Identifies	Cycles	
460	Identifies	Cycles	Biological
461	Identifies	Cycles	Decay
462	Identifies	Cycles	Energy
463	Identifies	Cycles	Food webs
464	Identifies	Cycles	Water/climate
465	Identifies	Cycles	Weather
466	Identifies	Definitions	
467	Identifies	Definitions	Operational
468	Identifies	Diseases	
469	Identifies	Elements	Names/symbols
470	Identifies	Food groups	
471	Identifies	Matter	
472	Identifies	Matter	Chemical properties
473	Identifies	Matter	Phases/states
474	Identifies	Matter	Physical properties
475	Identifies	Matter	Structure
476	Identifies	Matter	Uses
477	Identifies	Measurement units	
478	Identifies	Oceans	
479	Identifies	Organisms	
480	Identifies	Organisms	Bacteria
481	Identifies	Organisms	Fungi
482	Identifies	Organisms	Insects
483	Identifies	Organisms	Plants
484	Identifies	Organisms	Vertebrates/invertebrates
485	Identifies	Organisms	Viruses
486	Identifies	Questions	Research
487	Identifies	Rocks/minerals	

488	Identifies	Stars	
489	Measures	Distance/length	
490	Measures	Electric currents	
491	Measures	Energy/work	
492	Measures	Force	
493	Measures	Mass/weight	
494	Measures	Pressure	
495	Measures	Temperature	F/C
496	Measures	Time	
497	Measures	Volume	Liquids/solids
498	Uses	Computers	
499	Uses	Computers	Information processing
500	Uses	Computers	Mathematical applications
501	Uses	Computers	Problem solving
502	Applies/Uses	Scientific method	Models
503	Applies/Uses	Sound	Sources
504	Applies/Uses	Work	Done by gas
505	Applies/Uses	Work	Heat energy
506	Applies/Uses	Work	Relation to energy
507	Applies/Uses	Work	Thermodynamics
508	Describes/Explains	Atoms	Motion
509	Describes/Explains	Calories	...
510	Describes/Explains	Cells	Fermentation
511	Describes/Explains	Force	Buoyant
512	Describes/Explains	Force	Dissipative (friction)
513	Describes/Explains	Force	Electrical
514	Describes/Explains	Force	Equilibrium
515	Describes/Explains	Force	Lines of
516	Describes/Explains	Force	Magnetic
517	Describes/Explains	Force	Nuclear
518	Describes/Explains	Force	Radioactive

519	Describes/Explains	Heat	Energy
520	Describes/Explains	Heat	Fusion
521	Describes/Explains	Heat	Transfer
522	Describes/Explains	Heat	Vaporization
523	Describes/Explains	Heat	Work
524	Describes/Explains	Lenses	Magnification
525	Describes/Explains	Light	Electromagnetic wave
526	Describes/Explains	Magnetic	Fields
527	Describes/Explains	Motion	Gravity
528	Describes/Explains	Motion	Horizontal
529	Describes/Explains	Motion	Kinetic
530	Describes/Explains	Motion	Rectilinear
531	Describes/Explains	Motion	Relativity/space, time
532	Describes/Explains	Motion	Rotational
533	Describes/Explains	Motion	Vectors
534	Describes/Explains	Pressure	Atmospheric
535	Describes/Explains	Pressure	Blood
536	Describes/Explains	Pressure	Conversions
537	Describes/Explains	Pressure	Gas
538	Describes/Explains	Pressure	Gauge
539	Describes/Explains	Pressure	Hydraulic
540	Describes/Explains	Pressure	Vaporization
541	Describes/Explains	Resistance	...
542	Describes/Explains	Volts	...
543	Describes/Explains	Watts	...
544	Identifies	Chemical reaction	Fuel
545	Identifies	Electricity	Capacitors
546	Identifies	Electricity	Circuits
547	Identifies	Electricity	Magnetic field
548	Identifies	Electricity	Measurement
549	Identifies	Electricity	Resistors
550	Identifies	Electron	Diffraction
551	Identifies	Electron	Mass
552	Identifies	Electron	Measurement
553	Identifies	Energy	Atomic

554	Identifies	Energy	Atoms
555	Identifies	Energy	Heat as
556	Identifies	Energy	Internal
557	Identifies	Energy	Molecules
558	Identifies	Energy	Nuclear
559	Identifies	Energy	Renewable
560	Measures	BTUs	...
561	Measures	Joules	...
562	Orders	Data	...
563	Orders	Matrices	